Thick GCR Shield

Completed Technology Project (2014 - 2018)

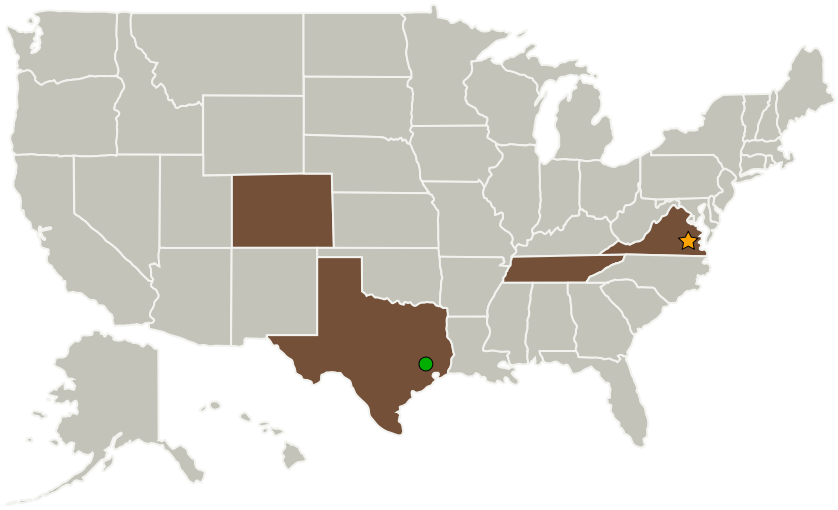
Project Introduction

Insufficient data exist to validate thick shield space radiation exposure predictions. This task seeks to validate the shielding efficiency of spacecraft materials and verify an optimum Galactic Cosmic Ray (GCR) shield thickness needed for minimal mass vehicle design.

Anticipated Benefits

Identification of optimal GCR shield thicknesses and quantification of the uncertainty associated with shielding efficiency for thick shields will enable minimal mass vehicle design and reduce uncertainty in astronaut risk predictions.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
●Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Game Changing Development

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Co-Funding Partners	Type	Location
Exploration Capabilities	NASA Program	
Human Spaceflight Capabilities	NASA Program	
Southwest Research Institute - San Antonio(SWRI)	Academia	San Antonio, Texas
Space Life and Physical Sciences Research and Applications Division(SLPSRA)	NASA Program	
The University of Tennessee-Knoxville(UT-K)	Academia	Knoxville, Tennessee

Primary U.S. Work Locations	
Colorado	Tennessee
Texas	Virginia

Project Transitions

October 2014: Project Start

September 2018: Closed out

Closeout Summary: The Advanced Radiation Protection (ARP) Thick Galactic C osmic Ray (GCR) Shielding project was designed to reduce astronaut radiation e xposure during long duration travel. Space vehicles will need additional mass to shield astronauts from space radiation. Optimizing the amount of mass used to t he degree of radiation protection provided requires a better understanding of th e shielding capabilities of current material systems. The project made significant advancements in the state of the art database development needed to underpin models for particle transport and astronaut radiation dose exposure. Experiment al measurements from guided experiments established data that were used as tr ansport code benchmarks to anchor software simulation and modeling prediction s. These efforts validated predictions of optimal shield thicknesses and shield effi ciencies with bounded uncertainties. Project results have been transferred to the Human Research Program (HRP) and Advanced Exploration Systems (AES) Archi tecture Design Teams.

Project Management

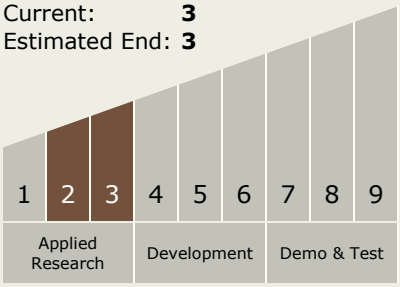
Program Director:
Mary J Werkheiser

Program Manager:
Gary F Meyering

Principal Investigator:
Kevin M Somervill

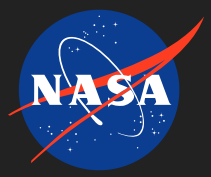
Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Target Destinations

The Moon, Mars, Others Inside the Solar System



Project Website:

https://www.nasa.gov/directorates/spacetech/game_changing_development/index.html